PROJECT CHARGE: 1706

PROJECT TITLE: TOBACCO PHYSICS

PROJECT LEADER: D. B. Losee

PERIOD COVERED: August 1 - 31, 1981

DATE OF REPORT: September 9, 1981

APPLICATION OF TECHNOLOGY (1,2,3,4,5)

The initial phase of research has been completed on the rate of heat transfer from a smoldering cigarette to an object in intimate contact with this smoldering cigarette. Regression analysis of the data on a series of commercial brands indicates a significant correlation between several of the physical parameters of the cigarette. Among the parameters examined the most important is the static burn time. Not surprisingly, there is an increase in the rate of heat transfer resulting from a decrease in burn time. The next most important parameter is the rod density which gave a decrease in the rate of heat transfer with an increase in density. Furthermore, an increase in cigarette circumference could be correlated with an increase in the rate of heat transfer. The fourth most important parameter was the percentage of expanded lamina present in the blend. An increase in this percentage increased the rate of heat transfer. The least important parameters were the paper additive level, paper porosity and the percentage of stems in the cigarette blend. A report describing this research is in preparation.

Work continues on the tower modelling effort with the inclusion of loading effects. Through the cooperation of Ms. Beth Donenfeld data and reports on the heat transfer and particle velocities for 4", 6", and 8" towers were obtained.

Recommendations were made to Ms. Carol Wicks concerning an instrumental method for distinguishing normal DIET from toasted DIET. Initially, the rental of a Hunter Lab tristimulus colorimeter was proposed for the off-line phase of the program.

N-IR diffuse reflectance data collection has begun on the seven component blend analysis.

Heat treatment runs were completed in the Parr Bomb on bright tobacco at 93°C for 48 hours in air and N_2 (< ½% O_2). Preliminary examination of the data shows little effect of the atmosphere in the sealed container on the major evolved species. The only significant difference thus far noted is the conversion of ambient O_2 into CO_2.

MODELS FOR COMBUSTION/PYROLYSIS (6,7,4,5,8)

O_2-chemisorption on 750°C pyrolysis tobacco residue was studied at 25°, 35°, 50°, 65°, 100°, 125°, and 150°C. The results indicate an increase in

2022151432

Source: https://www.industrydocuments.ucsf.edu/docs/pgxm0000

the amount of chemisorbed O_2 with an increase in temperature, while the kinetics can be described by the Elovich equation. Interestingly, from data obtained at 100°C and above there is an indication of the presence of at least two types of chemisorption sites on the tobacco residue. In order to further quantify these results improvements in instrumental stability are being pursued.

Nicotine, evolved as a function of temperature fraction, decreased in air by approximately 30% compared with that amount evolved in N_2. However, the peak temperature and the temperature profile remained the same.

A report on the coordinated pyrolysis mass balance study conducted as a function of 25°C temperature intervals is now in preparation.

Data collection on the isothermal effects of over 80 inorganic salts added to cellulose has been completed. Data have been plotted and are now being interpreted.

REFERENCES

1) C. O. Tiller, Notebook 7603.
2) D. L. Simpson, Notebook 7585.
3) P. A. Wilson, Notebook 7365.
4) B. E. Waymack, Notebook 7562.
5) K. R. Squire, Notebook 7440.
6) J. F. Bebbs, Notebook 7449.
7) P. E. Phillips, Notebook 7587.
8) A. Lewis, Notebook 7666.

/ev

2022151433

Source: https://www.industrydocuments.ucsf.edu/docs/pgxm0000